



Mini CNC Router

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SUMMARY

The mini CNC router is simple to build. If you have all the materials and parts prepared you should have it ready to work in less than 5 days.

I needed to build this mini CNC machine so I can make faster and more precise parts that I need for my other home projects.

You can also find the complete instructions at <http://www.instructables.com/id/Mini-CNC...> until I complete it here.

Step 1 — Mini CNC specifications



- The working area of the machine is X=450mm (approx. 17.5 inch) and Y=250mm (approx. 10 inch) and it can mill parts as high as Z=110mm (approx 5 inch). The maximum milling speed on X and Y axis is 2400mm/min. and on Z axis is 1800mm/min. The resolution of each axis is 1/50 or two hundredths of a millimeter and one motor revolution on each axis results in 4 mm of movement. The router used is a Kress 1050. The number of parts used for building this mini CNC machine is 42, excepting screws and nuts, and the total cost is \$1200.19.

Step 2 — Required tools and skills



- For this project you will need to have a set of screwdrivers and a set of hex keys or Allen keys, a drill for some extra holes, metal-cutting saw to cut some custom parts, soldering station or soldering gun to join the wires so they'll have good conductivity, and a multimeter. You should have knowledge of basic electronics, how to solder and how to use a multimeter.

Step 3 — Ordering components



- All the parts used to build the machine were bought from local dealers, so I suggest you do the same if it's cheaper (parts + transport). If not you can find all the parts on eBay. The trapezoidal cylindrical nut was made in a local workshop.

Step 4 — Mechanical components - aluminum profiles

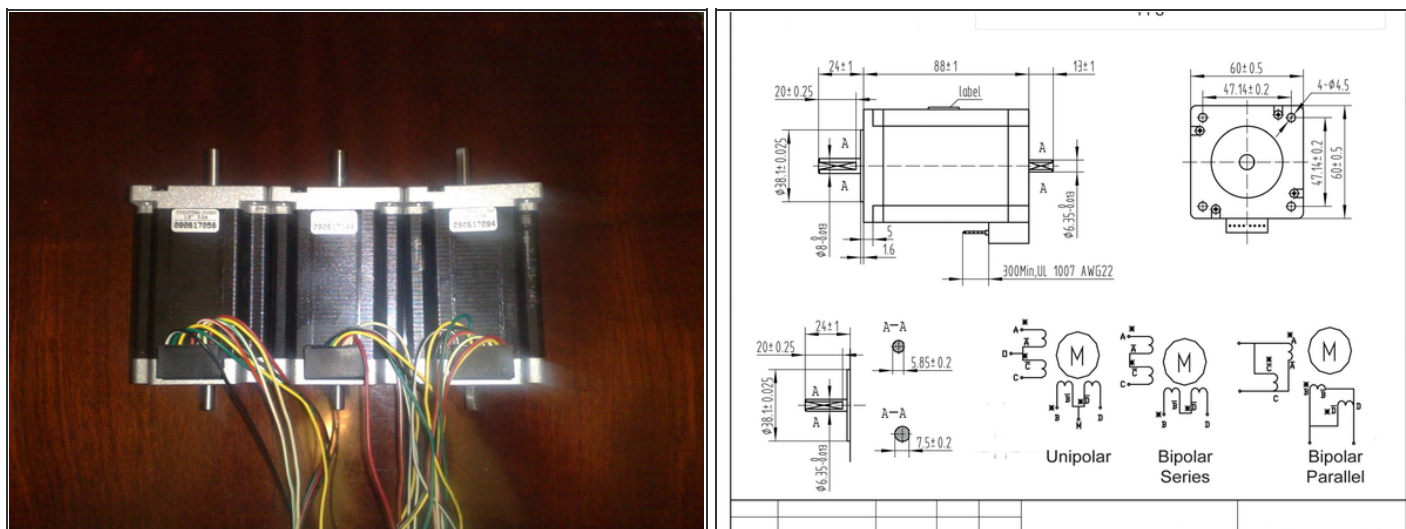


- The frame is made of aluminum profiles and the parts are:
- X base parts - 2 pieces of 400x120x30mm (cost: \$52.32);
- Y frame parts - 2 pieces of 400x120x30mm (cost: \$52.32), 1 piece of 380x60x30mm (cost: \$13.16);
- Y carriage - 1 piece of 120x120x30mm (cost: \$7.85);
- Z carriage - 1 piece of 120x120x30mm (cost: \$7.85);
- Z frame parts - 2 pieces of 120x60x30mm (cost: \$8.30);
- Machining the aluminum profiles (cost: \$72.00). Total cost: \$213.80.

Step 5 — Mechanical components - shafts, bearings and leadscrews

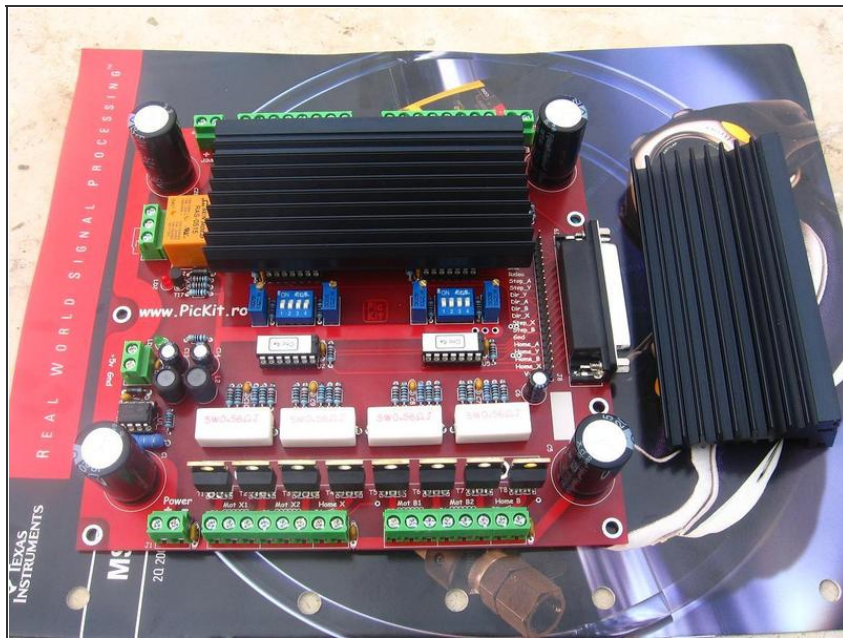


- Ø20mm precision steel shafts for X axis (cut from 1 piece of 60-inch=1524mm shaft): 2 pieces, each 600mm long (cost: \$54.00);
- Ø16mm precision steel shafts for Y axis (cut from 2 pieces of 30-inch=762mm shaft): 2 pieces, each 390mm long (cost: \$29.95);
- Ø16mm precision steel shafts for Z axis (cut from 2 pieces of 372mm shaft left over from the Y-axis shafts): 2 pieces, each 300mm long (cost: \$29.95);
- Machining the precision steel shafts: 6 pieces (cost: \$25.00).



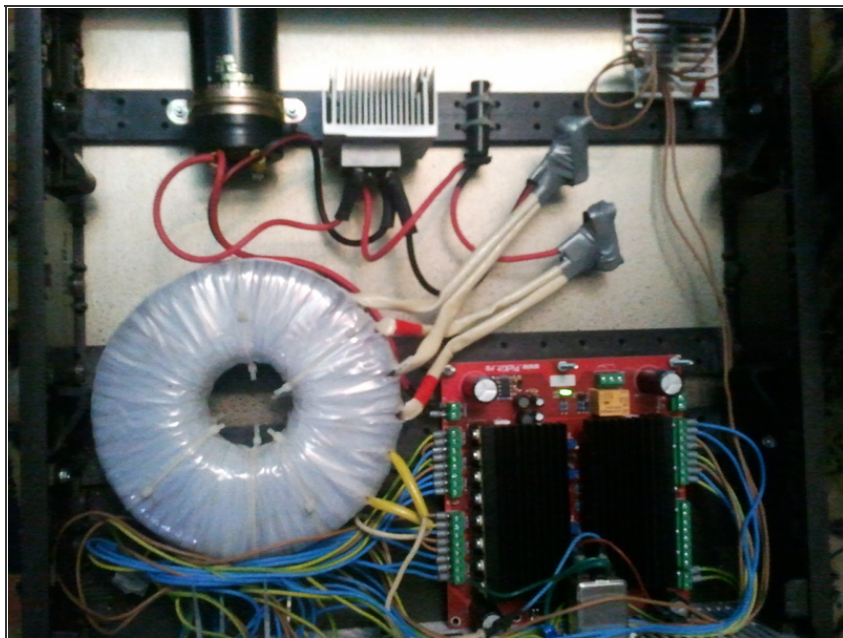
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Step 7 — Electronic components - motor controller



- The stepper motor driver used is a unipolar 4-axis driver for 5A/phase motors. Cost: \$82.50.
- Electrical properties:
 - Input Power: 20-40V DC.
 - Stepper motor drive current: 1.5A - 5A/phase.
 - Compatible stepper motors: 2 or 4 phase, 6 or 8 lead stepper motors, 5A max.
 - Dimensions: 18 x 12 x 6 cm (L x W x H).
- This board allows you to control 4 stepper motors, as well as receive input from two limit switches per motor and from an emergency-stop button, and it has a relay interface for spindle motors.

Step 8 — Power supply components



- The power source contains one 600W toroidal transformer (cost: \$76.60), one 50-amp rectifying bridge (cost: \$1.90) and one 20,000 μ F capacitor (cost: \$7.99). Total cost: \$86.49.

Step 9 — Motor controller case

- For the motor controller case I used an old Keithley236 source measure unit. I have removed all the guts of the old thing to make way for the new motor controller and power supply.

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